UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/608,086	06/30/2003	William Earl Russell II	8564-000045/US/DVA	8107

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EXAMINER
PALABRICA, RICARDO J

ART UNIT	PAPER NUMBER
3641	

DATE MAILED: 03/11/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

	Application No.	Applicant(s)
Office Action Summary	10/608,086	RUSSELL ET AL.
	Examiner	Art Unit	
	Rick Palabrica	3641	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *31-41* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *31-41* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____ .

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date *6/30/03*.

4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____ .

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

1.   Claims 31-41 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claim 31 recites performing an optimization process to generate one or more optimized independent control variable values. As presently set forth, optimization process cited as example by the applicant (see Fig. 6B) is essentially a "black box" with no description of the internals thereof. The disclosure is insufficient in failing to set forth in an adequate and sufficient fashion, a description of this optimization process that would enable it to perform its intended function. If the applicant is of the opinion that there is a description in the prior art (in the form of literature, etc. having a date prior to the filing date of this application) of the internals of this black box, copies of said literature, etc. must be submitted for appropriate review by the Office. See *In re Ghiron et al.,* 169 USPQ 723, 727.

It is a notorious technical fact that an optimization process includes a target or standard to be achieved, and certain parameters are iteratively modified until such target/standard is met. Claim 31 does not disclose any such target or standard. There is neither an adequate description nor enabling disclosure as to how and in what manner an optimization process can be performed based alone on the set point data for the reactor.

Optimization of control rod pattern would depend on a plurality of factors including coolant flow rate, power level, core burn-up, thermal limits, reactivity limits, etc. There is neither an adequate description nor enabling disclosure as to: a) how many independent control variables and how many dependent performance variables are needed to perform an optimization process for, say, one independent variable; b) whether the independent variables are considered in the analysis alone or in combination with the dependent variables; c) what weight to assign to each independent variable and to each dependent variable; d) if both independent and dependent variables are to be considered in the optimization, whether these two types of variables are analyzed concurrently or sequentially; etc.

The preamble of claim 31 recites a method for "updating independent control variable values." The optimization process recited in the body of the claim results in an optimum value for the independent variables. However, there is neither an adequate description nor enabling disclosure as to how an in what manner such optimum value is applied to updating the variables. Note that having an optimum value for a variable,

without actually applying it to amend a variable, where necessary, does not update said variable.

Claim 32 recites performing the optimization process based on the received state-point data and the at least one changed constraint. There is neither an adequate description nor enabling disclosure as to: a) how many state-point data and how many changed constraints would be required to perform an adequate optimization process; b) how and in what manner one determines the weight to be assigned to each state-point data and to each constraint; c) how and in what manner one selects the state-point data and the constraint to use in the process.

Claims 33 and 34 recite, "executing the performing step in response to receiving state-point data that differs from previously received state-point data." Underlining provided. There is neither an adequate description nor enabling disclosure as to: a) how one determines which "previously received data" to select, i.e., is it the data from the immediately preceding iteration, from the iteration 10 times before, 100 times before, or what?; b) what is meant by "differs", i.e., what attribute is different – value (as in different core flow value) or source of data (as in a different sensor providing the data), etc.

Claim 37 recites, "displaying at least a portion of the state-point data." There is neither an adequate description nor enabling disclosure as to: a) which set-point data to display, i.e., independent variables, dependent variables, or both; and b) which portion of the data set to display, i.e., top portion, middle portion or bottom portion?

Claims 38 and 39 recite, "displaying at least a portion of results from the performing step." The performing step is an iterative process comprising a plurality of steps, with each step generating a result or results. There is neither an adequate description nor enabling disclosure as to: a) which result from what step to display; and b) which portion of the results to display, i.e., top portion, middle portion or bottom portion?

Claim 40 recites the limitation, "first simulating nuclear reactor operation for <u>sets of independent control variable</u> values to produce <u>associated sets of dependent performance variable</u> values." Underlining provided. There is neither an adequate description nor enabling disclosure as to: a) how many sets of independent variables and how many sets of dependent variables must be selected to have an adequate optimization process; b) how does one select the respective members of the sets of independent and dependent variables for the optimization.

Claim 40 recites the limitation, "generating transfer functions based on the sets of independent control variable values and the sets of dependent performance variable values, the transfer functions representing functional relationships between the independent control variables and the dependent performance variables." There is neither an adequate description nor enabling disclosure as to: a) how many and what type of transfer functions are necessary to have an adequate optimization; b) how many independent variables must be included in the transfer function of one dependent variable, for example. Note that there can be a plurality of functional relationships between an independent and a dependent variable. For example, flow rate (an

independent variable) can have several functional relationships with power level (a dependent variable), i.e., flow rate vs. average core power, flow rate vs. power distribution, etc.

Claim 40 recites the limitation, "determining a set of independent control variable values for _possible use_ in operating the operating reactor _using the transfer functions._" There is neither an adequate description nor enabling disclosure as to what is encompassed by the term "use", i.e., is it for training operators, revising the operating limits, for updating the safety analysis report, or what?

The claim 40 language, "using the transfer functions", implies that the reactor is operated by means of the transfer function. A transfer function is an analytical equation or a relationship between two quantities, and cannot by itself be used in operation unless an operator or instrument performs an action based on said function. There is neither an adequate description nor enabling disclosure as to how and in what manner a transfer function alone can operate a reactor.

As presently set forth, transfer function elements cited by the applicant (see element 614, Fig. 6B) is essentially a "black box" with no description of the internals thereof. The disclosure is insufficient in failing to set forth in an adequate and sufficient fashion, a description of this transfer function block that would enable it to perform its intended function. If the applicant is of the opinion that there is a description in the prior art (in the form of literature, etc. having a date prior to the filing date of this application) of the internals of this black box, copies of said literature, etc. must be submitted for appropriate review by the Office. See _In re Ghiron et al.,_ 169 USPQ 723, 727.

Claim 41 recites the limitation, "generating from the base set of independent

control variable values, <u>modified sets of independent control variable</u> values associated

with each independent control variable in a <u>selected group of independent control</u>

<u>variables.</u>" There is neither an adequate description nor enabling disclosure as to: a)

how many modified sets of independent variables must be selected to have an

adequate simulation step; b) how does one select the members of the modified set from

the so-called "selected group of independent variables."

2.   Claims 31-41 are rejected under 35 U.S.C. 112, second paragraph, as being

indefinite for failing to particularly point out and distinctly claim the subject matter which

applicant regards as the invention. The claims are vague and indefinite, and their metes

and bounds cannot be determined for the reasons given in section 1 above.

Claim 40 is incomplete for omitting essential steps, such omission amounting to a

gap between the steps. The omitted step is the action required to operate the reactor,

e.g., based on the information derived from the transfer function.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that

form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3.   Claims 31-39 are rejected under 35 U.S.C. 102(b) as being anticipated by either one of Takeuchi et al. (U.S. 5,009,833) or Musick (U.S. 4,080,251).

Takeuchi et al. disclose an expert system for surveillance, diagnosis and prognosis of plant operation (see Figs. 1 and 2). Applicant's claim language reads on Takeuchi et al.'s method as follows: a) "optimization process" reads on expert system 20; b) "state-point data including current values for independent and dependent variables" read on plant data generated by sensors including pressurizer pressure and water level, containment radiation level, charging flow rate, etc. (see column 2, lines 35+); c) "constraints" read on either technical specification values or threshold values of reactor parameters (see column 3, lines 47+); d) "display" reads on operator's screen (see column 5, lines 50+).

As to the limitation in claim 35 regarding repetition of the receiving and performing steps, the expert system automatically loops back to access another set of plant conditions (see column 5, lines 65+). The disclosure does not define what is meant by "repeating the receiving and performing steps throughout operation of the operating reactor." Underlining provided. It is a notorious engineering fact that a reactor does not always operate at power, and there are times when the reactor is shutdown, e.g., for refueling, for maintenance, and maybe for very rare abnormal events requiring momentary shutdown. The examiner interprets applicant's language "throughout operation" as encompassing all the events enumerated. Based on such interpretation, Takeuchi et al. meets the claim limitation.

Musick discloses and apparatus and method for controlling a nuclear reactor

(see Figs. 1-10). Applicant's claim language reads on Musick's method as follows: a)

"optimization process" reads on the core protection calculator (e.g., see Figs. 6 and 6A);

b) "state-point data including current values for independent and dependent variables"

read on mass flow rate, power, in-core flux, DNBR, etc. (see, for example, Fig. 6); c)

"constraints" read on DNBR limit (see left hand side of block 98 in Fig. 6); d) "display"

reads on visual display of power limit (see right hand side of block 60 in Fig. 1). As to

the limitation in claim 35 regarding repetition of the receiving and performing steps,

Musick updates the DNBR calculation (see column 19, lines 1+). The system is used

during reactor operation (see Abstract).

4.   Claims 40 and 41 are rejected under 35 U.S.C. 102(b) as being anticipated by

either one of Takeuchi et al. As to the limitations in the claims regarding "simulating

reactor operation", Takeuchi et al. disclose the use of simulated plant data in place of

actual plant data (see column 1, lines 62+). As to the limitation in claim 41 regarding a

"modified set of independent control variable values" this reads on any of the sets of

values obtained by the expert system when it automatically loops back to access

another set of plant condition data (see column5, lines 65+).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5.   Claims 40 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable

over Musick in view of Takeuchi et al. Musick discloses the applicant's claims except for

the use of simulated plant data.

Takeuchi et al. teach the use of simulated plant data for evaluating plant

conditions (see Abstract). One having ordinary skill in the art would have recognized

that a simulator is used as a substitute for an actual reactor either in performing training

of operators or in conducting operational/safety analysis of plant conditions, because a

simulator is inherently safer and more economical to use for these purposes than a

reactor.

Therefore, it would have been obvious to one having ordinary skill in the art at

the time the invention was made to modify the method, as disclosed by Musick, by the

teaching of Takeuchi et al., to use, to gain the advantages thereof (i.e., safety and

economy), because such modification is no more than the use of well-known expedients

within the art, and the substitution of source of plant data for analysis by another well-

known source.

Conclusion

6.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Rick Palabrica whose telephone number is 703-306-

5756. The examiner can normally be reached on 7:00-4:30, Mon-Fri; 1st Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Michael Carone can be reached on 703-306-4198. The fax phone number

for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free).

RJP
March 4, 2004